[Third Edition.]

PATENT SPECIFICATION

Application Date: March 21, 1936. *No. 8531/36.* **477,084**
„ „ *April 30, 1936.* *No. 12285/36.*
„ „ *Sept. 1, 1936.* *No. 23908/36.*
„ „ *Feb. 20, 1937.* *No. 5119/37.*
One Complete Specification Left: March 1, 1937.
(Under Section 16 of the Patents and Designs Acts, 1907 to 1932.)
Specification Accepted: Dec. 21, 1937.

PROVISIONAL SPECIFICATION.
No. 8531 A.D. 1936.

Improvements relating to Crease Resisting Treatments of Textile Yarns and Fabrics.

We, THE CALICO PRINTERS' ASSOCIATION LIMITED, a British Company, LOUIS AMÉDÉE LANTZ, a French Citizen, and WILLIAM STUART MILLER, a British Subject, and all of St. James's Buildings, Oxford Street, Manchester, 1, do hereby declare the nature of this invention to be as follows:—

This invention relates to a finishing treatment of yarns or fabrics made of regenerated cellulose rayon and has for its object to provide an improved process for rendering such yarns or fabrics less liable to creasing.

It is known to render textile yarns or fabrics of vegetable origin less creasable by impregnating them with synthetic resin components, drying and thereafter heating them to form the insoluble resin substantially in and not on the fibre.

Our invention provides a process for rendering yarns or fabrics made of regenerated cellulose rayon less liable to creasing, without the formation of a synthetic resin in or on the fibres and without the necessity for completing the reaction by a separate heating operation.

Our invention consists in impregnating the said yarns or fabrics with a liquor containing formaldehyde and an amino-benzene mono-sulphonic acid, drying, allowing to lie at ordinary temperature for a prolonged time and finally washing and drying.

Drying after impregnation may be carried out at ordinary temperature, but the reaction starts more quickly and the process is technically more advantageous if the fibre is dried by the aid of heat in the customary manner, e.g. on steam heated cylinders. In this case the fibre is cooled immediately after drying, and the reaction proceeds smoothly to completion in the cold. This has the important advantage that the strength of the fibre is maintained and not impaired as it would be if the reaction were brought to completion by a further heat treatment such as is usual in the synthetic resin anti-crease process.

In one convenient application of our invention, a viscose rayon fabric is impregnated with a liquor containing 15% of formaldehyde and 2% of 1.4 amino-benzene sulphonic acid, dried in the customary manner over a set of steam-heated drying cans, cooled by an air passage, allowed to lie for 24 hours at ordinary room temperature, and finally washed and dried. After this treatment the fabric has become highly resistant to creasing or crushing, without its tensile strength being materially affected.

Dated this 20th day of March, 1936.
MARKS & CLERK.

PROVISIONAL SPECIFICATION.
No. 12285 A.D. 1936.

Improvements relating to the Finishing of Textile Yarns and Fabrics.

We, THE CALICO PRINTERS' ASSOCIATION LIMITED, a British Company, LOUIS AMÉDÉE LANTZ, a French Citizen, and WILLIAM STUART MILLER, a British Subject, and all of St. James's Buildings, Oxford Street, Manchester, 1, do hereby declare the nature of this invention to be as follows:—

[*Price* 1*s.*]

This invention relates to a finishing treatment of yarns or fabrics made of regenerated cellulose rayon and has for its object to provide an improved process for rendering such yarns or fabrics less liable to creasing and to shrinkage on washing.

It is known to render textile yarns or fabrics of vegetable origin less creasable by impregnating them with synthetic resin components, drying and thereafter heating them to form the insoluble resin substantially in and not on the fibre.

Our invention provides a process for rendering yarns or fabrics made of regenerated cellulose rayon less liable to creasing and to shrinkage on washing, without the formation of a synthetic resin in or on the fibres and without the necessity for completing the reaction by a separate heating operation.

Our invention consists in impregnating the said yarns or fabrics with a liquor containing formaldehyde and an aromatic sulphonic acid, drying, allowing to lie at ordinary temperature or at approximately ordinary temperature for a certain length of time and finally washing and drying.

Acids which have been found to give the desired result include benzene and naphthalene sulphonic acids, such as benzene monosulphonic acid, naphthalene 1- and 2-sulphonic acids, naphthalene 1—5 disulphonic acid, amino-benzene and amino-naphthalene sulphonic acids, such as aniline disulphonic acid, 1—4, 1—5, and 1—8 amino-naphthalene sulphonic acids, 2-amino-naphthalene 3—6 disulphonic acid, benzidine mono- and disulphonic acids, nitro-benzene sulphonic acids such as *m*-nitrobenzene sulphonic acid, nitro - amino - benzene sulphonic acids, such as *p*-nitraniline-*o*-sulphonic acid, amino-phenol and amino-naphthol sulphonic acids, such as *o*-amino-phenol-*p*-sulphonic acid and 1-amino-2-naphthol-4-sulphonic acid, and anthraquinone sulphonic acids, such as anthraquinone 2—7 disulphonic acid.

Drying after impregnation may be carried out at ordinary temperature, but the reaction starts more quickly and the process is technically more advantageous if the fibre is dried by the aid of heat in the customary manner, e.g. on steam heated cylinders. In this case the fibre is cooled immediately after drying, and the reaction proceeds smoothly to completion in the cold. The progress of the reaction can be followed by observing the degree of recovery of the material after having been subjected to a standard creasing test. The time required to complete the reaction, i.e. to reach the point where the recovery from creasing ceases to improve, varies according to the compound used and also to its proportion in the impregnating liquor. In certain cases the reaction is completed almost immediately after drying while in others it may take several hours or days to reach equilibrium conditions.

The possibility of carrying out the process at low temperature has the important advantage that the strength of the fibre is maintained and not impaired as it would be if the reaction were brought to completion by a further heat treatment such as is usual in the synthetic resin anti-crease process.

In one convenient application of our invention, a viscose rayon fabric is impregnated with a liquor containing 15% of formaldehyde and 3% of naphthalene 2-sulphonic acid, dried in the customary manner over a set of steam-heated drying cans, cooled by an air passage, allowed to lie for 30 minutes and finally washed and dried. After this treatment the fabric has become highly resistant to creasing or crushing without its tensile strength being materially affected, and its shrinkage on washing is also very much lessened.

Dated this 28th day of April, 1936.

MARKS & CLERK.

PROVISIONAL SPECIFICATION.
No. 23908 A.D. 1936.

Improvements relating to the Finishing of Textile Yarns and Fabrics.

We, THE CALICO PRINTERS' ASSOCIATION LIMITED, a British Company, LOUIS AMÉDÉE LANTZ, a French Citizen, and WILLIAM STUART MILLER, a British Subject, and all of St. James's Buildings, Oxford Street, Manchester, 1, do hereby declare the nature of this invention to be as follows :—

In our co-pending application for Patent No. 12285/36 (Serial No. 477,084), we have described a process for rendering yarns or fabrics made of regenerated cellulose rayon less liable to creasing and to shrinkage on washing, by impregnating said materials with a solution containing formaldehyde and one or more aromatic sulphonic acids, and thereafter drying and allowing to lie at approximately

This invention relates to a finishing treatment of yarns or fabrics made of regenerated cellulose rayon and has for its object to provide an improved process for rendering such yarns or fabrics less liable to creasing and to shrinkage on washing.

It is known to render textile yarns or fabrics of vegetable origin less creasable by impregnating them with synthetic resin components, drying and thereafter heating them to form the insoluble resin substantially in and not on the fibre.

Our invention provides a process for rendering yarns or fabrics made of regenerated cellulose rayon less liable to creasing and to shrinkage on washing, without the formation of a synthetic resin in or on the fibres and without the necessity for completing the reaction by a separate heating operation.

Our invention consists in impregnating the said yarns or fabrics with a liquor containing formaldehyde and an aromatic sulphonic acid, drying, allowing to lie at ordinary temperature or at approximately ordinary temperature for a certain length of time and finally washing and drying.

Acids which have been found to give the desired result include benzene and naphthalene sulphonic acids, such as benzene monosulphonic acid, naphthalene 1- and 2-sulphonic acids, naphthalene 1—5 disulphonic acid, amino-benzene and amino-naphthalene sulphonic acids, such as aniline disulphonic acid, 1—4, 1—5, and 1—8 amino-naphthalene sulphonic acids. 2-amino-naphthalene 3—6 disulphonic acid, benzidine mono- and disulphonic acids, nitro-benzene sulphonic acids such as *m*-nitrobenzene sulphonic acid, nitro - amino - benzene sulphonic acids, such as *p*-nitraniline-*o*-sulphonic acid, amino-phenol and amino-naphthol sulphonic acids, such as *o*-amino-phenol-*p*-sulphonic acid and 1-amino-2-naphthol-4-sulphonic acid, and anthraquinone sulphonic acids, such as anthraquinone 2—7 disulphonic acid.

Drying after impregnation may be carried out at ordinary temperature, but the reaction starts more quickly and the process is technically more advantageous if the fibre is dried by the aid of heat in the customary manner, e.g. on steam heated cylinders. In this case the fibre is cooled immediately after drying, and the reaction proceeds smoothly to completion in the cold. The progress of the reaction can be followed by observing the degree of recovery of the material after having been subjected to a standard creasing test. The time required to complete the reaction, i.e. to reach the point where the recovery from creasing ceases to improve, varies according to the compound used and also to its proportion in the impregnating liquor. In certain cases the reaction is completed almost immediately after drying while in others it may take several hours or days to reach equilibrium conditions.

The possibility of carrying out the process at low temperature has the important advantage that the strength of the fibre is maintained and not impaired as it would be if the reaction were brought to completion by a further heat treatment such as is usual in the synthetic resin anti-crease process.

In one convenient application of our invention, a viscose rayon fabric is impregnated with a liquor containing 15% of formaldehyde and 3% of naphthalene 2-sulphonic acid, dried in the customary manner over a set of steam-heated drying cans, cooled by an air passage, allowed to lie for 30 minutes and finally washed and dried. After this treatment the fabric has become highly resistant to creasing or crushing without its tensile strength being materially affected, and its shrinkage on washing is also very much lessened.

Dated this 28th day of April, 1936.

MARKS & CLERK.

PROVISIONAL SPECIFICATION.
No. 23908 A.D. 1936.

Improvements relating to the Finishing of Textile Yarns and Fabrics.

We, THE CALICO PRINTERS' ASSOCIATION LIMITED, a British Company, LOUIS AMÉDÉE LANTZ, a French Citizen, and WILLIAM STUART MILLER, a British Subject, and all of St. James's Buildings, Oxford Street, Manchester, 1, do hereby declare the nature of this invention to be as follows :—

In our co-pending application for Patent No. 12285/36 (Serial No. 477,084), we have described a process for rendering yarns or fabrics made of regenerated cellulose rayon less liable to creasing and to shrinkage on washing, by impregnating said materials with a solution containing formaldehyde and one or more aromatic sulphonic acids, and thereafter drying and allowing to lie at approximately

ordinary temperature before washing and drying.

We have now found that substantially the same process is also applicable to yarns and fabrics made from cotton, linen and/or other natural cellulosic materials, for the purpose of rendering them less liable to shrinkage on washing or to extension when damp, and less liable to creasing.

Our invention consists in impregnating such natural cellulosic yarns or fabrics with an aqueous solution of formaldehyde and of an aromatic sulphonic acid, drying whilst maintaining the dimensions desired in the finished article, and finally washing and drying.

Acids which have been found to give the desired results include benzene and naphthalene sulphonic acids, such as benzene monosulphonic acid, naphthalene 1- and 2-sulphonic acids, naphthalene 1—5 disulphonic acid, amino-benzene and amino-naphthalene sulphonic acids, such as sulphonic acid, aniline disulphonic acid, 1—4, 1—5, and 1—8 amino-naphthalene sulphonic acids, 2-amino-naphthalene 3—6 disulphonic acid, benzidine disulphonic acids, nitro-benzene sulsulphonic acids, such as *m*-nitro-benzene sulphonic acid, nitro-amino-benzene sulphonic acids, such as *p*-nitraniline-*o*-sulphonic acid, amino-phenol and amino-naphthol sulphonic acids, such as *o*-amino-phenol-*p*-sulphonic acid and 1 amino-2 naphthol-4 sulphonic acid, and anthraquinone sulphonic acids, such as anthraquinone 2—7 disulphonic acid.

The drying may be carried out under application of heat in the customary manner on stentering machines at temperatures approximating 100° C., the reaction being usually completed immediately after full drying.

The proportion of aromatic sulphonic acid in the impregnating liquor varies according to the particular sulphonic acid used, but in most cases very small amounts such as 0.2 to 0.8% on the weight of the liquor, are sufficient to produce the desired result at a temperature of approximately 100° C.

At temperatures of drying below 100° C. it is necessary to increase the proportion of sulphonic acid used and this may vary between 0.2 and 5% according to the acid employed and the temperature of drying.

As in Specification No. 12285/36 (Serial No. 477,084) the temperature of drying may be selected to give the most advantageous technical result.

In one convenient manner of carrying out our invention, a cotton fabric is impregnated with a liquor containing 15% of formaldehyde and 0.3% of naphthalene-2-sulphonic acid, dried on a stentering machine at 100° C., washed and dried. This treatment results in the fabric becoming resistant to shrinkage on washing and to extension when damp.

The process herein described may be applied to regenerated cellulose rayon.

Dated this 31st day of August, 1936.

MARKS & CLERK.

PROVISIONAL SPECIFICATION.

No. 5119 A.D. 1937.

Improvements relating to the Dyeing and Finishing of Textile Materials.

We, THE CALICO PRINTERS' ASSOCIATION LIMITED, a British Company, of St. James's Buildings, Oxford Street, Manchester, 1, LOUIS AMÉDÉE LANTZ, a French Citizen, and WILLIAM STUART MILLER, a British Subject, both of the Company's address, do hereby declare the nature of this invention to be as follows:—

In our co-pending Applications for Patents Nos. 8531/36 (Serial No. 477,084), 12285/36 (Serial No. 477,084) and 23908/36 (Serial No. 477,084), we have described a process for rendering yarns or fabrics made of cellulosic materials less liable to creasing and to shrinkage on washing, by impregnating said materials with a solution containing formaldehyde and one or more aromatic sulphonic acids, and thereafter drying and allowing to lie at approximately ordinary temperature before washing and drying.

We have now found that by using the same process we can make dyestuffs, such as direct dyestuffs, which give loose dyeings, or acid dyestuffs which do not fix at all on vegetable fibres, fast to washing. In addition we apply the said processes to loose cellulosic fibres prior to spinning as well as to yarns and fabrics.

Our invention consists in impregnating dyed natural cellulosic or regenerated cellulose rayon materials with an aqueous solution of formaldehyde and of an isocyclic sulphonic acid, drying, if neces-

sary allowing to lie at approximately ordinary temperature for some time, and finally washing and drying.

Our invention further consists in impregnating the materials with an aqueous solution of formaldehyde and of an isocyclic sulphonic acid together with a dyestuff, drying, if necessary allowing to lie at approximately ordinary temperature for some time, and finally washing and drying.

Our invention further consists in applying the dyestuff locally by spraying, printing or stencilling prior to or together with the aqueous solution of formaldehyde and of an isocyclic sulphonic acid.

Our invention further consists in treating the material, wholly or in part with formaldehyde, isocyclic sulphonic acid and, if desired, dyestuff, in two or three separate and subsequent operations, which may vary in sequence, provided no reaction takes place between these components and the fibre until after the last of these operations.

Acids which have been found to give the desired results are aromatic sulphonic acids such as those set out in our Applications 12285/36 (Serial No. 477,084) and 23908/36 (Serial No. 477,084), but other isocyclic sulphonic acids, such as *d*-camphor-10-sulphonic acid can also be used for this as for the processes of the above prior Applications.

The drying may be carried out under application of heat in the customary manner at temperatures ranging from 60° C. upwards but not materially exceeding 100° C.

The time required to complete the reaction varies according to the compound used, its proportion in the impregnating liquor, and the drying conditions. In certain cases the reaction is completed almost immediately after drying, while in others it may take several hours or days to reach full fixation of the dyestuff. In the latter case the material is advantageously cooled immediately after drying and the reaction allowed to proceed to completion at substantially ordinary temperature.

In one convenient application of our invention, a viscose rayon fabric is impregnated with a liquor containing 15% of formaldehyde, 2% of 1.4 aminobenzene sulphonic acid, and 2.5% of Acid Scarlet 4R (Col. Ind. No. 79), dried in the customary manner over steam-heated drying cans, cooled by air passage, allowed to lie for 12 days at ordinary room temperature and finally washed and dried.

After this treatment the dyestuff which normally has no affinity for the viscose, has become fixed to the extent of withstanding washing and hot soaping.

We may also locally inhibit the fixation of the dyestuff by application in parts of the material of substances which neutralise the acid contained in the impregnating liquor. For instance we may print a pattern on a viscose fabric using a printing paste containing zinc oxide, and after drying treat the fabric with a solution containing formaldehyde, an isocyclic sulphonic acid, and an acid dyestuff. The fabric is then dried at approximately 70° C. and washed. The result is a white pattern on a coloured ground.

Dated this 19th day of February, 1937.
MARKS & CLERK.

COMPLETE SPECIFICATION.

Improvements relating to the Dyeing and Finishing of Textile Materials.

We, THE CALICO PRINTERS' ASSOCIATION LIMITED, a British Company, LOUIS AMÉDÉE LANTZ, a French Citizen, and WILLIAM STUART MILLER, a British Subject, and all of St. James's Buildings, Oxford Street, Manchester, 1, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to a treatment of cellulosic materials and has for its object to provide an improved process for imparting to such materials an increased resistance to creasing or crumpling and/or an increased resistance to shrinking on washing and to extension when damp, and/or an increased fastness to washing of dyeings with relatively fugitive dyestuffs.

It is known to render textile yarns or fabrics less creasable by impregnating them with synthetic resin components, drying, and thereafter heating them to form the insoluble resin substantially in and not on the fibre.

It is also known to render fugitive dyestuffs fast to washing when applied to said fibres by similarly forming a synthetic resin on the fibres under certain specified conditions.

Our invention provides a process for

rendering cellulosic materials less liable to creasing, to shrinkage on washing and to extension when damp, and also for the fixation fast to washing of dyestuffs which normally have little or no affinity for cellulosic materials, without the formation of a synthetic resin in or on the fibres and without the necessity for completing the reaction by a separate heating operation.

Under cellulosic materials we comprise natural vegetable fibres, such as cotton and linen, and regenerated cellulose, such as viscose and cuprammonium rayon, but not cellulose esters, in the form of loose fibre, yarns, or fabrics, or any other form in which it can be subjected to wet treatment. Hereinafter for convenience of reference the said materials will be referred to collectively as cellulosic materials.

Our invention consists in impregnating cellulosic materials with formaldehyde and an aromatic sulphonic acid, drying, washing and drying. The impregnated material may be allowed to lie for a certain time at substantially ordinary temperature before washing off.

Our invention further consists in impregnating dyed cellulosic materials with formaldehyde and an aromatic sulphonic acid, drying, if necessary allowing to lie at approximately ordinary temperature for some time, and finally washing and drying.

Our invention further consists in impregnating the cellulosic material with formaldehyde and an aromatic sulphonic acid together with a dyestuff, drying, if necessary allowing to lie at approximately ordinary temperature for some time, and finally washing and drying.

Our invention further consists in applying the dyestuff locally by spraying, printing or stencilling prior to or together with the formaldehyde and aromatic sulphonic acid.

Our invention further consists in treating the material, wholly or in part, with formaldehyde, aromatic sulphonic acid and, if desired dyestuff, in two or three separate operations, which may vary in sequence, provided no reaction takes place between these components and the fibre until after the last of these operations.

Our invention further comprises the production of pattern effects by the local application prior to impregnation with formaldehyde, aromatic sulphonic acid and dyestuff, of a substance or substances which inhibit the fixation of the dyestuff by neutralising the acid contained in the impregnating liquor.

Acids which have been found to give the desired results include benzene and naphthalene sulphonic acids such as benzene monosulphonic acid, naphthalene 1- and 2-sulphonic acids and naphthalene 1—5 disulphonic acid; amino sulphonic acids, such as amino-benzene 2-, 3- and 4-sulphonic acids, aniline disulphonic acid, benzidine disulphonic acid, 1—4, 1—5 and 1—8 amino naphthalene sulphonic acids, and 2-amino-naphthalene 3—6 disulphonic acid; hydroxy sulphonic acids, such as phenol-2-sulphonic acid, 2-naphthol - 6 - sulphonic acid, and 2-naphthol-3-6-disulphonic acid; halogen substituted sulphonic acids, such as 2—5 dichlorbenzene sulphonic acid; nitro-sulphonic acids, such as *m*-nitrobenzene sulphonic acid; nitro-amino-sulphonic acids, such as *p*-nitraniline-*o*-sulphonic acid; amino-hydroxy sulphonic acids such as *o*-amino-phenol-*p*-sulphonic-acid and 1-amino-2-naphthol-4-sulphonic acid; and quinone sulphonic acids, such as anthraquinone 2—7 disulphonic acid.

Dyestuffs which can advantageously be fixed fast to washing include those which have a certain affinity for vegetable fibres, but are normally loose to washing, such as direct dyestuffs, and others which normally have practically no affinity for these fibres, such as acid dyestuffs, basic dyestuffs without their usual fixing agents, water-soluble mordant dyestuffs without metallic mordant, and water-soluble acetate rayon dyestuffs.

Drying after impregnation may be carried out at ordinary temperature, but the reaction starts more quickly and the process is technically more advantageous if the fibre is dried by the aid of heat in the customary manner, e.g. in the case of a fabric, on steam heated drying cylinders or stentering machines or the like at the usual drying temperatures ranging from about 60° C. upwards but not materially exceeding 100° C.

The reaction takes place wholly or partly during drying. In the latter case the fibre may advantageously be cooled immediately after drying, and the reaction allowed to proceed to completion at substantially ordinary temperature.

The time required to complete the reaction varies according to the compound used and also to its proportion in the impregnating liquor. In certain cases the reaction is completed immediately after full drying, while in others it may take several hours or days to reach equilibrium conditions. The temperature of drying may be selected to give the most advantageous technical result.

The possibility of carrying out the process at low temperature has the important advantage that the strength of the fibre is maintained and not impaired as it

would be if the reaction were brought to completion by a further high temperature heat treatment, such as is usual in the synthetic resin anti-crease process.

The proportion of aromatic sulphonic acid in the impregnating liquor varies according to the particular acid used, the drying conditions, the nature of the fibre, and the effect it is desired to obtain. Amounts ranging from 0.2 to 5% on the weight of the impregnating liquor have, however, been found the most suitable.

The invention is further illustrated by the following examples.

EXAMPLE 1.

A fabric made of viscose staple fibre is impregnated with a solution containing 15% formaldehyde and 3.5% *o*-aminophenol-*p*-sulphonic acid, dried for 10 minutes in hot air at a temperature of 80° C., washed in a faintly alkaline solution for 10 minutes at 60° C., and finally dried. The treated fabric has become highly resistant to creasing and crumpling.

EXAMPLE 2.

A viscose rayon fabric is impregnated with a solution containing 15% formaldehyde, 5% naphthionic acid, and 2.5% Lissamine Fast Yellow 2G (Col. Ind. No. 639), dried in hot air for 8 minutes at 70° C. and then washed off and dried as in Example 1. The result is a yellow fabric which is fast to washing and crease resistant.

EXAMPLE 3.

A viscose crepe fabric is impregnated with a solution containing 15% formaldehyde and 1% benzene sulphonic acid, dried under controlled tension for 9 minutes at 60° C., washed and dried. After this treatment it has become crease resistant and its previous liability to shrink or to extend when wet has been very much reduced.

EXAMPLE 4.

A viscose staple fabric previously dyed with Paramine Fast Brown M (Col. Ind. No. 420) is impregnated with a solution containing 15% formaldehyde and 3% 2-naphthol-6-sulphonic acid, dried for 10 minutes at 60° C., washed and dried. The fabric has become crease resistant, and the colour withstands hot soaping.

EXAMPLE 5.

A mercerised cotton poplin is impregnated with a solution containing 12% formaldehyde and 0.27% naphthalene 2-sulphonic acid, dried under controlled tension at a temperature of 95° C., washed and dried. The shrinkage of the fabric on washing is very much reduced.

EXAMPLE 6.

A viscose staple fabric is impregnated with a solution containing 14% formaldehyde, 2.35% Acid Scarlet 4R (Col. Ind. No. 79), and 1.4% 2—5 dichlorobenzene sulphonic acid, dried in hot air for 7 minutes at 75° C., washed and dried. The fabric has become highly crease resistant, and the red colour withstands hot soaping.

EXAMPLE 7.

A viscose taffeta is impregnated with a solution containing 13% formaldehyde, 2.15% Acid Scarlet 4R (Col. Ind. No. 79) and 1.7% sulphanilic acid, dried over steam-heated cylinders, quickly cooled, allowed to lie at ordinary temperature for 12 days and then washed and dried. By this time the dyestuff has become fixed to the extent of withstanding prolonged hot soaping and the crease resistance of the fabric is very much improved.

EXAMPLE 8.

A viscose staple fabric is impregnated with a solution containing 14% formaldehyde and 4% 2-2[1] benzidine disulphonic acid, dried in hot air for 8 minutes at 75° C., rapidly cooled and allowed to lie for 2 days at ordinary temperature and then washed and dried. The fabric has become highly crease resistant.

EXAMPLE 9.

A mercerised plain cotton fabric is impregnated with a solution containing 13.5% formaldehyde and 0.7% naphthalene 2-sulphonic acid, dried in hot air for 5 minutes at 60° C., washed and dried. The crease resistance of the fabric is much improved after the treatment.

EXAMPLE 10.

Loose viscose staple fibre is impregnated with a solution containing 16.5% formaldehyde, 2.75% Lissamine Fast Yellow 2G (Col. Ind. No. 239), and 1.9% 2-naphthol 3—6 disulphonic acid, dried in hot air for 12 minutes at 70° C., washed and dried. The fibre may be spun and woven into a coloured fabric which is crease resistant and fast to washing.

EXAMPLE 11.

A viscose staple fabric is printed with a paste containing 5% zinc oxide, dried and afterwards impregnated with a solution containing 14% formaldehyde, 2.35% Acid Scarlet 4R (Col. Ind. No. 79) and 1.4% phenol 2-sulphonic acid, dried in hot air for 10 minutes at 70° C., washed and dried. The resultant effect shows a white pattern on a red ground.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is :—

1. In the treatment of cellulosic materials for the purpose or purposes specified, impregnating the materials with formaldehyde and an aromatic sulphonic

acid, drying, washing and drying.

2. The treatment of dyed cellulosic materials as claimed in Claim 1 for the purpose of giving an increased fastness to washing of the dyeings which may be by relatively fugitive dyestuffs.

3. Impregnating cellulosic materials with formaldehyde, an aromatic sulphonic acid and a dyestuff, drying the materials, if necessary allowing to lie at approximately ordinary temperature, and finally washing and drying, by which the dyeings which may be by relatively fugitive dyestuffs are given increased fastness to washing.

4. In the treatment of cellulosic fabrics to give dyeings thereof fastness to washing as claimed in Claim 2 or 3, applying the dyestuff by spraying, printing or stencilling prior to or together with the formaldehyde and aromatic sulphonic acid.

5. Treating the cellulosic materials for the purpose or purposes referred to wholly or in part with formaldehyde, aromatic sulphonic acid and if desired a dyestuff, in two or three separate operations, which may vary in sequence provided no reaction takes place between the components and the cellulosic material until after the last operation.

6. The production of pattern effects using relatively fugitive dyestuffs and rendering said effects fast or relatively fast to washing, by the local application prior to impregnation with formaldehyde, aromatic sulphonic acid and dyestuff, of a substance or substances which inhibit the fixation of the dyestuff by neutralising the acid contained in the impregnating liquor.

7. The improved process of imparting to cellulosic materials an increased resistance to creasing or crumpling, substantially as described.

8. The improved process of imparting to cellulosic materials an increased resistance to shrinking on washing and to extension when damp, substantially as described.

9. The improved process substantially as described, of increasing the fastness to washing of dyeings on cellulosic materials with relatively fugitive dyestuffs.

10. Cellulosic materials treated by any of the processes herein described or in accordance with any of the examples herein set forth.

Dated this 25th day of February, 1937.

MARKS & CLERK.

Abingdon: Printed for His Majesty's Stationery Office, by Burgess & Son.
[Wt. 8138.—50/4/1939.]